

ARTEMIS

A WWW-based Intranet for Clinical Information

Robert R. Shank

Roy R. Lawson

Concurrent Engineering Research Center / West Virginia University

Many of the rapidly expanding set of tools and de-facto standards which are fueling the explosive growth of the World Wide Web and the Internet can be leveraged to effectively meet the requirements of teams of clinicians who provide care in a distributed environment. With the addition of components necessary to satisfy the unique requirements of creating, viewing, and sharing clinical information in a community-based intranet, the ARTEMIS system empowers its users with uniform interface to clinical information

In addition to the ease of use afforded by the hypertext paradigm, this Web-based approach with the addition of firewall technology allows integrated access to remote resources available via the Internet.

ARTEMIS was designed to meet the needs of primary care physicians and mid-level providers practicing in rural West Virginia. These requirements include aspects of both clinical information access and support for real-time and asynchronous collaboration.

The ARTEMIS network currently consists of eight sites in southwestern West Virginia. Six of the sites are run by Valley Health Systems, Inc. (VHS), which operates clinics in underserved areas of the region. Other sites include Cabell Huntington Hospital (CHH) and St. Mary's Hospital, both referral facility in Huntington, WV. Many of the VHS providers practice at several of the clinics and all admit patients to CHH and St. Mary's and refer to hospital specialists. Participant groups at the hospitals include perinatology, radiology, and the medical records and information systems groups.

Sites are linked with each other and the Internet via high speed frame relay services from the local telephone companies. Providers access clinical records from PCs and SPARCstations in the hospitals and clinics and remotely via Integrated Services Digital Network (ISDN) or standard analog dial-up lines. Internet access is controlled through a firewall at a single site.

Clinical trials of ARTEMIS are underway in support of the prenatal and general practice at VHS and are being expanded to support the entire patient life-cycle.

ARTEMIS consists of several components developed by project researchers as well as commercial products.

The "back end" of ARTEMIS supports unified information retrieval from multiple, distributed, heterogeneous information sources. This model-based access is built on an implementation of the Common Object Request Broker Architecture (CORBA) standard for distributed object computing. In addition to supplying the "front end" of the system, information objects can be delivered in Health Level Seven (HL7) format to any other client.

The "front end" of the system is based on the power of the HyperText Transfer Protocol (HTTP), HyperText Markup Language (HTML). Enhanced support required for the clinical environment is provided via Java and JavaScript. This approach offers a consistent interface across platforms, including PCs, Macintoshes™, and Unix™/X-Windows workstations. Clinical information can be viewed from widely available WWW browsers such as Netscape™.

Wide-area collaboration and referral among providers is supported by:

- CERC's MONET desk-top conferencing system for real-time support, and
- CERC's ZEN-mail, a multi-media mail system using the Privacy Enhanced Mail (PEM) and MIME protocols.

In this presentation we will provide a technical overview of the ARTEMIS system, including both hardware and software components, and give live demonstrations of how the system is being used on a day-to-day basis. We will focus on the Web-based user interface and will include:

- charting - creating multi-media entries in the record, including Web-based dictation and transcription support,
- retrieval - accessing distributed virtual records,
- referral - using ZEN-mail multi-media mail, and
- consultation - using the MONET desktop conferencing system.